The effect of grape seed extract and aerobic activity on lipid profile in obese elderly women

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Abstract

Introduction: Excessive physical exercise overproduces reactive oxygen species. Even if elite sportsmen increase their antioxidant status by regular physical training, this improvement is not sufficient to limit free radical production during the competition period which can be detrimental to the body. This study evaluates the effect of grape seed supplementation along with aerobic exercise on lipid profile in elderly women.
Materials and methods: In a double-blind study, 40 obese women (BMI≥30) upper 60 years old were randomly selected and divided into two groups of experimental (10 individuals) and control (10 individuals). The experimental group received 2 GE supplementation (100mg·d-1) for 4 weeks. Exercise program included aerobic exercise activities at 45 to 60 percent of maximum heart rate for 4 weeks and three 60-minute sessions per week. Blood samples were collected after 12 hours fasting before the study and 48 hours after the last session of the study. One-way ANOVA followed by LSD test was used for the statistical analysis.
Results: The results of the present study shows that there is a significant difference among amount of cholesterol, triglyceride and LDL-C before and after the study, but these amounts were not significant in the control group.
Conclusion: According to the present study results, 4 weeks aerobic exercise can prevent atherosclerosis and improve people's health and it can control and reduce atherosclerosis in obese individuals.

Keywords: Aerobic exercise, Grape Seed Extract, lipid profile, cardiovascular disease, elderly

Introduction

One of the main concerns of the international community is how to secure and protect older people's health. They are involved with important problems such as aging, cardiovascular disease and coronary problems. Heart-cardiovascular diseases (CVD) and non-infectious diseases are caused by many factors. They are mostly noted by hypertension, diabetes, smoking, family history, education, population, high body mass index (BMI), weight gain percent, waist-to-hip ratio, total cholesterol level, and LDL (low-density lipoprotein) levels. According to the World Health Organization, heart disease is the main cause of cardiovascular deaths in the world each year so that 7/16 million people worldwide die due to CVD affection. These amounts to over 29% (one third) of deaths in the world, 80% in low-and middle-income countries ~~and~~ half of it occurring in women (1-3). America Heart Association has introduced the major risk factors for atherosclerosis for two groups: 1 - Treatable with medication or lifestyle changes (such as obesity, diabetes, physical inactivity, hypertension, and lipid disorders), and 2 - Incurable (such as age, heredity and gender) (2, 4-7). These newer agents are risk factors for coronary heart disease or atherosclerosis call (4, 8-9). This molecule induces IL-6 affecting CRP synthesized by hepatocytes. Half-life of three to five days in platelet aggregation, endothelial damage, coagulation process, blood viscosity and red blood cells have a major role to play (10,11). Today, the positive effects of exercise and physical activity are properly fixed for primary and secondary prevention of heart-coronary disease. Physical activity can reduce body fat and obesity which are the risk factors for heart disease possibly by reducing inflammatory markers and coagulation. Thus, it reduces cardiovascular morbidity and mortality in high-risk patients (13-15). Grape seed extract also inhibits lipase and esterase enzymes (16-18). It reduces serum cholesterol and triglycerides (19-21). But, there are many controversies about this issue in this study so that we studied the effect of this supplementation on lipid profile. Grape seed extract (GSE) ~~which~~ is an integral part of having a very strong antioxidant effect of flavonoid properties (20, 21). Grape seeds contain fat, protein, carbohydrates and polyphenols and 5 to 8 percent of its value varies depending on the grape species and genera (21, 25-27). Polyphenols are compounds found in most flowers, plants, fruits and seeds of the fruit. Cocoa, coffee, apples, green tea, grapes, pomegranates and nuts contain high amounts of polyphenols (22, 27). The polyphenols found in grape seed extract contains flavonoids, acid galice, flavonoid monomeric 3 - catechin, catechin epithelium 3 - Galit and Dimeric, poly meric proseianidin monomeric and poly (21,23,25). In the meantime, the most effective anti-oxidation compound is in the grape seed proanthocyanidins. Grape seed extract is known as a strong antioxidant that protects the body against premature aging and disease (21, 22, 26). These studies provide evidence that these index inflammatory effects of endurance exercise are presented. However, some results have been inconsistent, which also limit the generalization ability, weight adjustment, the actual amount of regular physical activity, but there is still room for doubt. So, determining the endurance exercise intensity and duration shows the appropriate model for health promotion for older people in their community resulting in a lot of important social problems. This study examined the effects of aerobic endurance along with consumption extract of seed grape supplement on lipid profile in women.

Materials and methods

Participants: This study was a randomized, semi experimental research with a control group. The participants included 10 non-active women, from a nursing home ageing 55-65 years with no previous history of regular physical activity in the past two years. The subjects were randomly divided into two groups: each group was supplied with either 400mg GE supplementation, or 400mg of placebo (maltodextrin) under capsule conditioning (2 capsules) to be taken along with their breakfast over a one month period. In a meeting with the participants, the manager, physicians, and nurses of the nursing centers, research objectives and methods were described, and a letter of invitation explaining the purpose and manner of conducting the research, along with consent forms of voluntary participation, health and disease risk questionnaires were given to all the subjects. None of the participants had a history or clinical signs of cardiovascular diseases, diabetes, and hypertension. They also did not take any specific medicine, dietary and pharmaceutical supplements.

Anthropometric data of subjects are presented in (Table 1).

Nutritional status: The necessary nutritional data were collected using a 24-h dietary intake questionnaire (two working days and one day off in a week, to determine the average nutrient intake) in which all the participants were asked to write down everything they ate and drank in the past 24 h (15). To help participants remember the exact amount of food eaten, household containers and modules were used. The questionnaire was completed for each participant in 12 non-consecutive days (3 times a week for 8 weeks). The food values were converted to grams using household scales' guide (16). Each food was then coded according to the food processor software program and was analyzed by a nutrition expert to evaluate the energy content and nutrients (15).

Research protocol: This investigation was a semi-experimental, double-blind study. The subjects were randomly categorized into 2 groups of 10 individuals: exercise – supplements and placebo. Individuals in the extract seed grape supplement in form of one capsules (produced by the British company Seven Seas) for 4 weeks. The placebo group used two capsules of maltodextrin 2% (produced by Zacharia Company). The aerobic exercise program lasted for 8 weeks, and was conducted three sessions a week, with 45 to 60 percent of the subjects ‘ maximum heart rate. At the beginning of the study (D0), and after 30 days of supplementation of GE or placebo (D30), blood samples were taken from the subjects after they had fasted overnight for > 10h. Blood samples were collected in dry, EDTA/K3-coated and lithium/heparin-coated tubes. Serum (blood in dry tubes) and plasma (blood in EDTA/K3-coated tubes) were separated by centrifugation at 4°C and 2000g for 10min. Serum was immediately treated with 10μL·mL-1 of inhibitor cocktail (EDTA, antibiotic and anti-protease). The remaining plasma was directly stored at -80°C for antioxidant capacity determination. Plasma coming from EDTA/K3-coated tubes was stored at -80°C for lipid profile analysis.

Statistical analyses: After conducting the appropriate tests to confirm the normality of the variables' distribution and the equality of variances, two-way ANOVA in a public linear model was carried out to determine the effects of exercise and supplement on the research variable. To find significant results, post hoc Tukey test was used to determine the differences between the groups. To determine the difference between pre- and post-test values, paired t-test was conducted for each group. Statistical significance was set at $P < 0.05$.

Results

Experimental and control groups were age and height matched (61.65 ± 7.42 vs. 60.88 ± 5.33 years, P=0.88 and 161.25 ± 7.44 vs. 160.22 ± 6.84 meters, P=0.14, respectively). 4 weeks after treatment in the experimental group, co-administration of GSE and ET had more improving effects on TC, TG, HDL-c, LDL-c, and VLDL (P<0.0, Table 1). In the control group, no significant differences were observed in the pre-test to post-test variables. The control group had a slight increase in the normal ranges of these indices but not significant as seen in a while (Table 2).

Table 1.Mean values of anthropometric variables in group pretest-posttest study.

Variable	Experimental group		Control group		P value
	Pretest	Posttest	Pretest	Posttest	
Weight (kg)	87.78 ± 5.41	84.94 ± 5.21	88.74 ± 4.09	89.56 ± 6.12	0.44
FFA (%)	33.78 ± 3.60	29.21 ± 5.04	32.88 ± 3.56	33.95 ± 4.25	0.63
BMI (kg/m^2)	32.56 ± 2.37	29.24 ± 2.21	33.70 ± 2.69	32.44 ± 2.18	0.21

FFA, free fatty acid. BMI, body mass index.

Table 2.Mean values of research variables in group pretest-posttest study.

Variable	Experimental group		p value	Control group		p value
	Pretest	Posttest		Pretest	Posttest	
Cholesterol (mg/dL)	220.49 ± 41.15	198.73 ± 36.31	0.037	219.72 ± 34.44	221.38 ± 35.54	0.049
Triglycerides (mg/dL)	195.33 ± 51.83	139.66 ± 48.38	0.017	196.64 ± 47.37	198.19 ± 45.16	0.000
HDL-C (mg/dL)	71.74 ± 13.74	57.33 ± 12.69	0.215	76.11 ± 16.18	69.39 ± 17.56	0.042
LDL-C (mg/dL)	145.12 ± 18.63	126.52 ± 12.25	0.047	148.22 ± 14.14	149.41 ± 18.21	0.012

HDL-C, high density lipoprotein cholesterol.

Discussion

Recent studies suggest blood cells' sticking to the surface of the arteries detected as one of the earliest events in atherosclerosis process. Thus, identifying effective ways to reduce inflammation and reducing inflammatory markers may be important in terms of clinical applications. Studies have shown that aerobic exercise reduces body fat percentage, body mass index, hip circumference and weight measurements, waist and arms as well as the amount of total cholesterol, triglycerides, low-density lipoprotein and high-density and thereby maintain and the influence of body weight - are important (12-13). All researchers believe that weight loss and body fat are important for the effect on lipid profile in practice setting that lipid profile levels are higher than normal levels of training effectiveness reducing. Most factors are (13,14). In the present study, body weight, body fat percentage and body mass index were significantly decreased after 8 weeks of aerobic exercise. Given the range of factors and lipid profiles in subjects in their study were higher than normal levels. In the present study, factors such as age, sex, body mass index, supplements, pharmaceuticals, and food-related heart disease - such as diabetes and high blood pressure vessel and its components as possible from the questionnaires were controlled. However, some limitations hinder optimal control for other factors such as diet, smoking, heredity, and are subject dreaming it. Furthermore, the beneficial effects of physical activity on coronary heart disease may be associated with a reduction of inflammatory markers, more research on the effects of aerobic exercise intensity, duration and frequency vary from study and control diet on markers predictive of heart disease - a disease of the elderly is essential. Positive changes in lipid profile induced by co-administration of GSE and ET in the experimental group may occur via an increase in triglyceride lipolysis (24), improvement of antioxidant oxidant ratio (25), and altered synthesis of LDL-C or removal rate of LDL-C from the plasma by the tissues (20). In general, antioxidants play a major role in prevention of diabetes and its complications by free radicals scavenging (26).These are scavenging the free radicals, helping the degradation of cholesterol, and directing the cholesterol towards bile acid synthesis (27). In the present study, GSE significantly improved lipid profile in co-administration of GSE and ET as an antioxidant.

Conclusion

In summary, this trial is the first showing that consumption of GE standardized in flavones permits ameliorating the oxidative stress/antioxidant status balance during an activity period, and enhances physical performance. Moreover, grape seed extract combined with exercise training had a more significant improving effect on help asma lipid profile compared to the control group. Thus, it may constitute a convenient and inexpensive therapeutic approach to some diabetic complications. This evidence suggests that the enhancement in performance might be caused, at least in part, by the protective action of GE during physical exercise. Further studies have to be conducted in order to confirm the link among the oxidative stress/antioxidant status balance, cellular protective action, and performance enhancement effects caused by the consumption of GE in individual.

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